

Part 1 -- Claims

1. (Previously Amended) A varactor comprising:
 - a diode junction;
 - a depletion region adjacent to the diode junction; and
 - a doped region beginning at the diode junction, including the
- 5 depletion region and having a nonuniform dopant concentration profile that continuously increases with increasing depth of the doped region starting from the diode junction and continuing to a peak concentration region;
- and wherein the continuously increasing nonuniform dopant concentration profile causes the varactor to have an approximately linear
- 10 capacitance/voltage response characteristic.
2. Canceled
3. (Previously Amended) A varactor as defined in claim 1 wherein:
 - the nonuniform dopant concentration profile is defined by an
 - equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the
 - doped region, B is a concentration constant and m is an exponent that determines
- 5 the degree of curvature of the dopant profile, and m is greater than 1.
4. Canceled
5. (Original) A varactor as defined in claim 3 wherein m is about 3.
6. (Previously Amended) A varactor as defined in claim 3 wherein:
 - B is in a range from about $1.0E13/cm^3$ to about $1.0E19/cm^3$; and
 - m is greater than one.
7. (Original) A varactor as defined in claim 6 wherein B is about
- 1.0E16/cm³.
- 8.-10. Canceled
11. (Withdrawn) A method of forming a varactor in a semiconductor substrate comprising:

- forming a first doped region of a first dopant type with a nonuniform dopant concentration profile from a low-doped end of the first doped region to a high-doped end of the first doped region;
- forming a second doped region of a second dopant type adjacent the low-doped end of the first doped region;
- forming a diode junction between the first and second doped regions;
- forming a depletion region in the first doped region adjacent the second doped region by reverse biasing the diode junction; and
- establishing a capacitance between the first and second doped regions that is approximately linearly related to the reverse biasing.
12. (Withdrawn) A method as defined in claim 11 further comprising:
forming a conductive path to and from the varactor through the high-doped end of the first doped region.
13. (Withdrawn) A method as defined in claim 11 further comprising:
forming the first doped region with the nonuniform dopant concentration profile defined by an equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines a degree of curvature of the nonuniform dopant concentration profile.
14. (Withdrawn) A method as defined in claim 13 wherein m is greater than zero.
15. (Withdrawn) A method as defined in claim 13 wherein m is about 3.
16. (Withdrawn) A method as defined in claim 13 wherein:
 B is in a range from about $1.0E13/cm^3$ to about $1.0E19/cm^3$; and
 m is greater than zero.
17. (Withdrawn) A method as defined in claim 16 wherein B is about $1.0E16/cm^3$.